SECTION 27 51 29
EMERGENCY COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1, 26 and 28 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. High Availability Server Appliance.
2. IP Endpoint Speaker, LCD Display, Microphone and LED Flasher.
3. IP Endpoint Speaker (dual-sided), LCD Display and LED Flasher.
4. IP Endpoint LCD Display, Microphone and LED Flasher.
5. IP Endpoint, Supplemental Interior Public Address Speakers.
6. IP Endpoint SIP Strobe.
7. IP-to-Analog Gateway.
8. Analog Power Amplifier.
9. Exterior, Vandal Resistant Public Address Speakers.
10. Conductors and Cables.
11. Identification.

B. Related Requirements:

1. Section 270526 - Grounding and Bonding for Communication Systems
2. Section 270528 - Pathways for Communications Systems
3. Section 271300 - Communications Backbone Cabling
4. Section 271500 - Communications Copper Horizontal Cabling
5. Section 275123 - Intercommunications & Program Systems.

C. This specification describes the installation, testing, and documentation of all devices, appliances, speakers and endpoints related to the Emergency Communication System (ECS).

D. The Contractor shall abide by and provide a complete ECS in compliance with the information included in this specification and on respective construction documents.

E. The Contractor shall provide all labor, supervision, tooling, miscellaneous mounting hardware, and consumables for all systems installed.

F. It is the Contractor's responsibility to propose product data, acquire and provide any and all items required for a complete operational system.

1.3 CODES AND STANDARDS

A. Underwriters Laboratories Inc. (UL): Applicable listings and ratings.

B. California Electrical Code (Articles 770, 800, latest issue).

C. National, State, and Local Occupational Safety and Health Administration (OSHA) building and fire codes.

D. ANSI/TIA/EIA-568.1 - Commercial Building Telecommunications Infrastructure Standard, Revision D or latest iteration.

E. ANSI/TIA/EIA-568.2 - Balanced Twisted-Pair Telecommunications Cabling and Components Standard, Revision D or latest iteration.

F. ANSI/TIA/EIA-568.3 - Optical Fiber Cabling and Components Standard, Revision D or latest iteration.

G. ANSI/TIA-569 Telecommunications Pathways and Spaces, Revision E or latest iteration.

H. ANSI/TIA-606 Administration Standard for Telecommunications Infrastructure, Revision C or latest iteration.

I. ANSI/TIA-607 Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises, Revision D or latest iteration.

J. ANSI/TIA-758 Customer-Owned Outside Plan Telecommunications Infrastructure Standard, Revision B or latest iteration.

K. Institute of Electrical and Electronic Engineers (IEEE) 802.3 (Ethernet), 802.3Z (Gigabit Ethernet over optical fiber), 802.3ab (Gigabit Ethernet over 4 pair category 5e or higher), 802.11a/g/n (Wireless LAN).

L. National Electrical Manufacturer's Association (NEMA).

M. National Fire Protection Association (NFPA), NFPA-70.

N. Uniform Building Code: CCR Part 2.

1.4 DEFINITIONS

A. Active Equipment: Server appliance and PoE enabled IP Endpoints.

B. AD: Active Directory - A Microsoft-based directory services to manage access and permissions to data resources.

C. CAP: Common Alerting Protocol - Digital format for exchanging emergency alerts that allows a consistent alert message to be disseminated simultaneously over many different communications systems.

D. Close Proximity: Within 15 feet of network drop location and IP Speaker mount via patch cord.

E. Cross-Connect: A facility enabling the termination of cable elements and their interconnection or cross-connection.

F. e911: Enhanced 911 services that provide additional location data to emergency responders using the PSAP and District location database.

G. ECS: Emergency Communication System. An electronic communication system for the primary purpose of supporting one-way and two-way communication of emergency information between school administrators and groups of individuals and / or school sites.

H. EMI: Electromagnetic Interference - Interference caused by one electrical or electronic device to another by the electromagnetic fields set up by its operation.

I. Enclosure: Electrically rated backbox for IP Speakers and other interior surface-mounted electronics.

J. IP: Internet Protocol - Internet addressing scheme governing connectivity between network-based devices.

K. LAN: Local Area Network - The site-based network consisting of copper-horizontal cabling, fiber-optic cabling, and associated active networking equipment.

L. LDAP: Lightweight Directory Access Protocol - Client / server protocol for accessing X.500-based directory services.

M. NWS: National Weather Service - Alerts utilizing CAP format for weather events.

N. Native IP-based system: A system that utilizes IP-based networking protocols including: structured cabling, local area network equipment, and /or WIFI for connectivity between devices and system controller.

O. PA: Public Address - A system of microphones, amplifiers, and loudspeakers used to amplify speech or music in a large building or at an outdoor gathering.

P. PCB: Printed Circuit Board - A printed circuit board mechanically supports and electrically connects electrical or electronic components using conductive tracks, pads and other features etched from one or more sheet layers of copper laminated onto and/or between sheet layers of a non-conductive substrate.

Q. PSTN: Public Switched Telephone Network.

R. PoE: Power over Ethernet - A networking feature defined by the IEEE 802.3af and 802.3at standards. PoE lets Ethernet cables supply power to network devices over a structured cabling data connection.

S. Intercom/Public Address System: An existing analog or digital paging / intercom system installed at a school site. May include: central control unit, zonal paging units, paging amplifiers, interior speakers and exterior horns / speakers, integrated clock / bell / speakers, power supplies and battery backups.

T. PSAP: Public Safety Access Point - Public utility database with specific location data for accurate location services in the case of an Enhanced 911 (e911) call.

U. REST API: Representational State Transfer is a software architectural style that defines a set of constraints to be used for creating Web services. Web services that conform to the REST architectural style, called RESTful Web services, provide interoperability between computer systems on the Internet.

V. RCDD: Registered Communications Distribution Designer.

W. RTP: Real Time Protocol - Network protocol for delivering audio and video over IP networks.

X. SIP: Session Initiated Protocol - Signaling protocol used to establish a “session” between 2 or more participants, modify that session, and eventually terminate that session used primarily for VoIP and IP telephony.

Y. PBB: Primary Bonding Busbar.

Z. RBB: Rack Bonding Busbar.

AA. RoHS: Restriction of Hazardous substances.

BB. SBB: Secondary Bonding Busbar.

CC. VoIP: Voice-over Internet Protocol - IP telephone system installed in new and modernization schools as a replacement for analog or digital phone systems.

DD. USGS: United States Geographical Survey - Scientific agency providing information and alerts for earthquakes.

EE. WAN: Wide Area Network - Telecommunications network connecting each school site and District offices and buildings to the District centralized network resources and the Internet.

1.5 SYSTEM DESCRIPTION

A. The Emergency Communication System (ECS) is an electronic communication system for the primary purpose of supporting one-way and two-way communication of emergency information between school administrators and groups of individuals and / or school sites.

B. This ECS is commonly designed to convey information over multiple types of devices, from speakers to text messaging to live streaming video, forming a unified communication system intended to optimize communications during emergencies.

C. Different from emergency notification systems, which generally deliver emergency information in one direction, emergency communication systems are capable of both initiating and receiving information between multiple parties. These systems are often made up of both input devices, sensors, and output/communication devices.

D. Emergency communication information can originate from a variety of sources and locations, from which the system will disseminate that information to one or more target groups.

E. The ECS will provide features and functions of an operational, two-way intercommunication system including all necessary equipment, accessories and materials necessary for a complete and functioning system for school.

F. Singlewire's InformaCast Fusion is a full-featured IP-based mass emergency communication system that provides all the features of the SDUSD's ECS requirements.

G. InformaCast alert software reaches on-premises and mobile devices with an array of messaging formats, using a single interface, as required for District ECS applications.

H. InformaCast is natively IP-based. All network-based display and speaker endpoints shall be utilized for mass emergency notification and ECS applications, including: IP Displays and Speakers, VoIP phones, LAN connected desktop computers, wireless laptops, Chromebooks, smartphones and digital signage.

I. The InformaCast Fusion paging system is hybrid cloud-based, meaning that a combination of vendor-cloud and District-based hardware resources are required for paging and ECS features.

J. High Availability – Hybrid cloud-based paging / intercom system shall include a hardware-based high availability component that supports site-based survivability and operational continuity in the case of loss of connectivity to the paging server host, or LAN / WAN / Internet outage. This device shall also be supported by existing Uninterruptible Power Supply (UPS) in the case of a power outage.

1. The ECS high availability device shall be installed within the site MDF and power connected to an operational Uninterruptible Power Supply (UPS) via the MDF isolated power service.

2. The Vendor shall assess and verify the operational status of the existing UPS battery to support the attached equipment for a nominal 90 minutes in the case of a power outage.
3. If the existing UPS is determined to be inadequate, the Vendor shall include, within the scope of this service, provision and installation of new UPS equipment.
4. If replacement of a UPS is required, the vendor shall coordinate service downtime with the site and district IT department.

K. Cisco Unified Communications Manager – The District is standardized on Cisco UCM for IP telephony and voice services. The ECS shall be fully compatible and leverage the features and capabilities of integration with the IP Voice and paging / intercom system.

L. Active Directory Synchronization – The District standard for directory services is Microsoft's Active Directory. The InformaCast Fusion High Availability appliance is designed to provide site survivability and must synchronize with the Active Directory service.

M. IP-to Analog Integration – The InformaCast Fusion ECS shall be integrated with IP-to-Analog Gateway equipment in each building to support Analog Paging Exterior Speakers / Horns. Analog paging amplifiers may be used to support multiple Analog Paging Exterior Speakers as necessary based on speaker wattage / amplification requirements.

N. Standardized IP Endpoints or equivalent:

1. AtlasIED IP Endpoint Speaker, LCD Display, Microphone and LED Flasher.
2. AtlasIED IP Endpoint Speaker (dual-sided), LCD Display and LED Flasher.
3. AtlasIED IP Endpoint LCD Display, Microphone and LED Flasher.
4. AtlasIED IP Endpoint, Supplemental Interior Public Address Speakers.
5. AtlasIED IP Endpoint SIP Strobe.

O. Standardized Analog Endpoints or equivalent:

1. AtlasIED IP-to-Analog Gateway.
2. AtlasIED Analog Power Amplifier.
3. Exterior Vandal Resistant Public Address Speakers.

P. Each IP Endpoint shall feature InformaCast compatibility.

Q. Non-proprietary Implementation: The District reserves the right to refuse or accept the use of any vendor's network equipment which employs the use of a vendor proprietary protocol(s) or capabilities required to deliver an overall operational system. Furthermore, the District reserves the right to refuse or accept the use of any vendor's proprietary protocols or capabilities that would prohibit future network implementations that rely on current prevailing industry standards.

R. Unless approved by the District, the Contractor shall guarantee that the Contractor's implementation precludes the use of any network equipment vendor proprietary

protocols or capabilities required to either deliver an overall operational system or preclude future implementations that rely on prevailing industry standards.

1.6 TECHNICAL PREREQUISITES

A. Verify LAN, WAN, and PSTN circuits are terminated and functioning properly. Configure firewalls in the traffic path to allow InformaCast Fusion to function.

B. Ensure the network routes IP multicast traffic from the InformaCast Fusion server to all endpoints that require audio (IP Phones, IP Speakers, and/or Desktops).

C. Ensure adequate bandwidth is provisioned on links and Quality of Service queues have sufficient capacity for application traffic.

D. Ensure telephony and other servers, infrastructure, and equipment that integrates to, or interacts with, InformaCast Fusion have remote access available to support troubleshooting.

E. Ensure any hardware and software to be used and/or integrated with is compliant with InformaCast. This includes, but is not limited to, CUCM versions, IP Phones, VMware ESXi versions, etc.

1.7 EQUIPMENT STANDARDS

A. Where applicable all components installed under this Contract shall be registered and listed by the Underwriters Laboratories (UL).

B. All major managed ECS equipment and components shall be of like products from a single Manufacturer except otherwise approved by the District.

C. The Contractor shall provide all structured cabling, pathways, enclosures, backboxes, penetrations, analog components and associated infrastructure provisions to facilitate the installation of active equipment by the District or the District's Systems Integrator.

D. The Contractor shall provide each system and subsystem as a complete, tested and commissionable system, including:

1. ECS system that is fully integrated including but not limited to High Availability server, IP Endpoint speakers, wall mount speakers, gateways amplifiers and external endpoint speakers.
2. End-to-end cabling validation and certification.
3. LAN equipment commissioning.
4. WAN connectivity to cloud services.
5. Infrastructure and integration with analog endpoints.
6. ECS programming.

7. A total operational ECS.

1.8 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings:

1. Reflected ceiling plans, drawn to scale, on which ceiling-mounted items including luminaires, diffusers, grilles, speakers, sprinklers, access panels, and special moldings are shown and coordinated with each other, using input from installers of the items involved.
2. Elevation drawings, drawn to scale, on which wall-mounted items including luminaires, intercommunications components, windows, doors, access panels, wall finishes, trims, piping, and conduit are shown and coordinated with each other, using input from Installers of the items involved.
3. Floor plan drawings, drawn to scale, on which device locations are shown.
4. Wiring diagrams shall show typical wiring schematics, including the following:
   a. ECS Server / Appliance hardware.
   b. Local Area Network (LAN) cabling and connecting hardware.
   c. IP Endpoints.
   d. Exterior Vandal Resistant Public Address Speakers.
   e. Integration and Interconnections with sub-systems.
   f. Analog wiring infrastructure.
5. Detail mounting assemblies showing elevations and physical relationship between the installed components.

1.9 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer, qualified layout technician, installation supervisor and field inspector.

B. Source quality-control reports.

C. Field quality-control reports.

1.10 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For the emergency communication system to include in operation and maintenance manuals. In addition to items specified in Section 01 78 23 "Operation and Maintenance Data," include the following:

1. A record of District's equipment-programming option decisions.

2. Plans, drawn to scale, indicating location, designation, construction deviations and connection of system components.

1.11 QUALITY ASSURANCE

A. Installer Qualifications: An authorized representative who is factory-trained and approved by product Manufacturer.

1. The installing cable Contractor shall hold a current C7 Contractor's license.

2. The installing pathway Contractor shall hold a current C10 Contractor's license.

3. The installing Contractor(s) must have a minimum of three years installation experience with the manufacturer's products.

4. The cabling Installer must have personnel certified by BICSI on staff.
   a. Layout Responsibility: Preparation of Shop Drawings **[and Cabling Administration Drawings][, Cabling Administration Drawings, and field testing program development]** by an RCDD.
   b. Installation Supervision: Installation shall be under the direct supervision of [**Registered Technician**] [**Level 2 Installer**], who shall be present at all times when Work of this Section is performed at Project site.

B. System: The campus shall be served by one single Manufacturer's unified ECS system equipment.

1.12 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer and Installer agree to repair or replace components of system devices and equipment that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

1.13 COORDINATION

A. Coordinate the layout and installation of ceiling-mounted IP endpoints with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

B. Coordinate the layout and installation of ECS backboxes with Architectural wall elevations and casework shop drawings. Where appropriate, provide horizontal and or vertical alignment with other wall mounted features.

C. Coordinate the installation of IP endpoint devices with the District or the District's Systems Integrator. The ECS system must be complete prior to the approval of substantial completion for the project.

D. Prior to material procurement, verify that all IP endpoint device backboxes are appropriately sized to accommodate their respective IP endpoint devices.

E. Activate Fusion Server licenses and enable software downloads.

PART 2 - PRODUCTS

2.1 HIGH AVAILABILITY SERVER APPLICANCE

A. Manufacturer: Provide products by the following:

1. SingleWire InformaCast Fusion Server Appliance – No Substitutions

B. Description: InformaCast Fusion Server Appliance and the optional High Availability service, local InformaCast messaging will continue to function when SRST mode is established.

1. The software version of InformaCast Fusion requires users to have virtual computing resources.

2. Computing Specifications:
   a. Intel Celeron N3160 1.6GHz quad-core processor
   b. 4 GB RAM
   c. 128 GB SSD
   d. Hardware Ports:
   e. DisplayPort (preferred console monitor) or HDMI
   f. Gigabit Ethernet LAN port (non-power over Ethernet)
   g. USB 3.0 or USB-C port (keyboard access)
   h. Physical Dimensions: 4.6" L x 4.4" W x 1.4" H
   i. Power supply: Level 6 AC-DC adapter
   j. Operational temperature range: 0 to 40 °C.

2.2 IP ENDPOINTS

A. Manufacturer: Provide products by the following:

1. AtlasIED – or equivalent

B. IP ENDPOINT SPEAKER, LCD DISPLAY, MICROPHONE AND LED FLASHER

1. Description: AtlasIED IP-SDMF-72 wall mounted IP speaker with LCD display, microphone, LED flasher and analog transformer switch.

2. General Performance: The PoE+ Indoor IP2 Endpoint Speaker System shall include factory assembled speaker, IP addressable PCB amplifier/control, plastic baffle, integrated microphone, LED Multi-color Flasher and 25v/70.7v Transformer & Switch.

a. The speaker shall be an 8” coaxial driver with low-frequency reproducer cone shall be a full 8” in diameter and the high frequency reproducer cone shall be 2” in diameter. The woofer shall have a 10oz ceramic magnet; the tweeter shall have 2.35oz ceramic magnet. The two reproducer sections shall be coupled through a built-in crossover network.

   The crossover frequency shall be at 2800Hz. The speaker dispersion shall be 105° and frequency response range shall be 70Hz – 1.5kHz, (±5dB). Sensitivity shall be 98dB at 1 Watt/1 meter. Voice coil impedance shall be 8Ω. Low frequency voice coil diameter shall be 1" and operate in a magnet field of at least 10,600 gauss. The maximum depth of the loudspeaker shall not exceed 2-7⁄8".

b. The amplifier/control board shall receive announcements and messages using dynamically routed data on a standard Ethernet Network. It shall include a Single-Channel Class D Topology amplifier with Primary and Secondary Outputs capable of producing 25-watts RMS when using an IEEE 802.3at compatible PoE+ switch or 24VDC local power supply and 12-watts RMS when used with an IEEE 802.3af compliant PoE switch. Interconnect shall be via female RJ-45 connector mounted to the PCB.

c. The amplifier/control board shall include (2) logic inputs, (1) relay output, (1) Auxiliary Unbalanced line level audio input and (1) Unbalanced line level audio output. The Auxiliary Line Level input shall include an auto mute function that is activated when a broadcast is sensed from the control application.

d. The amplifier/control board shall include a Graphical User Interface (GUI) for SIP configuration. The SIP implementation shall support standards G.711, G.722 and RTP protocols. The Graphical User Interface (GUI) shall configure and manage logic inputs, relay outputs, and Auxiliary audio input.

e. The unit shall incorporate an integrated microphone to allow full duplex talkback communication functionality based upon chosen software platform.

f. The unit shall incorporate a High-Resolution Back-Lit color LCD display with viewable dimensions of 8.66" wide x 2.23" (56.72mm) high. It shall receive visual notifications by AtlasIED’s GCK, Syn-Apps' SA-Announce, Singlewire’s InformaCast software platforms. It shall display time when in standby mode from AtlasIED’s GCK, Syn-Apps' SA-Announce, Singlewire’s InformaCast software platforms or by NTP. The display shall produce 1900 cd/m^2 lux brightness and display text and/or time.

g. The unit shall incorporate a LED flasher with viewable dimensions of .5" height x 3.5" wide. The LEDs shall be able to produce RGB color spectrum with brightness of 310-lux (Red), 348-lux (Green), 352-lux (Blue). It shall have the capability of multi-speed flash rate and will be software controllable.

h. All control functionality shall be determined via software. It shall be compatible with AtlasIED’s GCK, Syn-Apps' SA-Announce, Singlewire’s

InformaCast software platforms and SIP standalone operation. The PoE+ Indoor IP Endpoint Speaker System overall dimensions shall be 14.38" x 12.88" x 2.77". Finish shall be neutral white electrostatic powder coat micro perforated grill with plastic trim ring.

3. Backboxes: AtlasIED IP-FEST-SD flush mount enclosure, AtlasIED IP-SEST-SD surface mount enclosure, AtlasIED IP-SEA-SD angled wall mount enclosure.

C. IP ENDPOINT SPEAKER (DUAL-SIDED), LCD DISPLAY AND LED FLASHER

1. Description: AtlasIED IP-DDS dual sided LCD display with loudspeakers and flasher or equivalent.

2. General Performance: The PoE+ Indoor IP Endpoint Visual System shall consist of a factory assembled double sided wall or ceiling mount enclosure containing 2 LCD displays that can display time as well as scrolling text and IP addressable PCB amplifier/control with amplified output to drive small analog loudspeaker zones. The model shall also feature LED flashers located below the display can be used to alert room occupants of an incoming scrolling text message in accordance with ADA compliance. The unit shall incorporate loudspeaker drivers on each side of the display.

   a. The speakers shall be an 3" in diameter full range transducer each mounted next to LCD display on opposite sides within the metal housing. The speaker dispersion shall be 135° and Frequency response range shall be 800Hz – 4kHz, (±5dB). Sensitivity shall be 92dB at 1 Watt/1 meter. Voice coil impedance shall be 8Ω.

   b. The amplifier/control board shall receive announcements and messages using dynamically routed data on a standard Ethernet Network. It shall include a Single-Channel Class D Topology amplifier with Primary and Secondary Outputs capable. of producing 25-watts RMS when using an IEEE 802.3at compatible PoE+ switch or 24VDC local power supply and 12-watts RMS when used with an IEEE 802.3af compliant PoE switch. Interconnect shall be via female RJ-45 connector mounted to the PCB.

   c. The amplifier/control board shall include (2) logic inputs, (1) relay output, (1) Auxiliary Unbalanced line level audio input and (1) Unbalanced line level audio output. The Auxiliary Line Level input shall include an auto mute function that is activated when a broadcast is sensed from the control application.

   d. The amplifier/control board shall include a Graphical User Interface (GUI) for SIP configuration. The SIP implementation shall support standards G.711, G.722 and RTP protocols. The Graphical User Interface (GUI) shall configure and manage logic inputs, relay outputs, and Auxiliary audio input.

   e. The unit shall incorporate a High-Resolution Back-Lit color LCD display with viewable dimensions of 8.66" wide x 2.23" high. It shall receive visual notifications by AtlasIED's GCK, Syn-Apps' SA-Announce, Singlewire's

InformaCast software platforms. It shall display time when in standby mode from AtlasIED's GCK, Syn-Apps' SA-Announce, Singlewire's InformaCast software platforms or by NTP. The display shall produce 1900 cd/m^2 lux brightness and display text and/or time.

f. The unit shall incorporate a LED flasher with viewable dimensions of .5" height x 3.5" wide. The LEDs shall be able to produce RGB color spectrum with brightness of 310-lux (Red), 348-lux (Green), 352-lux (Blue). It shall have the capability of multi-speed flash rate and will be software controllable.

g. All control functionality shall be determined via software. It shall be compatible with AtlasIED's GCK, Syn-Apps' SA-Announce, Singlewire's InformaCast software platforms and SIP standalone operation. The Indoor IP Endpoint Visual System overall dimensions shall be 9.9" x 19.94" x 7" HxWxD.

D. IP ENDPOINT LCD DISPLAY AND MICROPHONE

1. Description: AtlasIED IP-DM indoor wall mount IP LED display with integrated talkback microphone or equivalent.
2. Extend notifications with effective visual text alerts for high ambient noise areas or large spaces.
3. General Performance: IP-DM The PoE+ Indoor IP Endpoint Visual System shall consist of a factory assembled wall mountable LCD display that shall show time as well as scrolling text. The unit shall incorporate an integrated microphone to allow full duplex talkback communication functionality based upon chosen software platform.

   a. The amplifier / control board shall receive announcements and messages using dynamically routed data on a standard Ethernet Network. It shall include a Single-Channel Class D Topology amplifier with Primary and Secondary Outputs capable of producing 25-watts RMS when using an IEEE 802.3at compatible PoE+ switch or 24VDC local power supply and 12-watts RMS when used with an IEEE 802.3af compliant PoE switch.

4. Backboxes: AtlasIED IP-FEC-DM flush mount enclosure, AtlasIED IP-SEC-DM surface mount enclosure.

E. IP ENDPOINT SUPPLEMENTAL INTERIOR PUBLIC ADDRESS SPEAKER, (Wall)

1. Description: AtlasIED IP-SM-72 Indoor wall / ceiling mount IP speaker with microphone and 25v/70v switch or equivalent.
2. General Performance: IP-SM-72 indoor wall / ceiling mount IP speakers with talkback provide enhanced audio for environments where network-wide communication is desired and that require large speakers with high output to overcome high ambient noise areas or large spaces.

   a. The speaker shall be an 8" Coaxial driver with low-frequency reproducer cone shall be a full 8" (203mm) in diameter and the high frequency

reproducer cone shall be 3" (76mm) in diameter. The woofer shall have a 10oz. (260g) ceramic magnet; the tweeter shall have a 2.35oz. (67g) ceramic magnet. The two reproducer sections shall be coupled through a built-in crossover network.

b. The crossover frequency shall be at 2800Hz. The speaker dispersion shall be 105° and frequency response range shall be 86Hz – 15.5kHz, (±5dB). Sensitivity shall be 98dB at 1 Watt / 1 meter. Voice coil impedance shall be 8Ω. Low frequency voice coil diameter shall be 1" (25mm) and operate in a magnet field of at least 10,600 gauss. The maximum depth of the loudspeaker shall not exceed 2-7 /8" (73mm).

3. Backboxes: AtlasIED IP-FEST-SD flush mount enclosure, AtlasIED IP-SEST-SD surface mount enclosure, AtlasIED IP-SEA-SD angled wall mount enclosure.

F. IP ENDPOINT SUPPLEMENTAL INTERIOR PUBLIC ADDRESS SPEAKER

1. Description: AtlasIED IP-22SYSMF 2’ x 2’ suspended ceiling mount IP speakers with talkback or equivalent.

2. General Performance: The unit shall be AtlasIED model IP-22SYSMF. The PoE+ Indoor Ceiling Mount IP Endpoint Speaker System shall include factory assembled speaker, IP addressable PCB amplifier / control, steel perf baffle, and integrated microphone.

a. The speaker shall be an 8" Coaxial driver with low-frequency reproducer cone shall be a full 8" (203mm) in diameter and the high frequency reproducer cone shall be 3" (76mm) in diameter. The woofer shall have a 10oz. (260g) ceramic magnet; the tweeter shall have a 2.35oz. (67g) ceramic magnet. The two reproducer sections shall be coupled through a built-in crossover network.

b. The crossover frequency shall be at 2800Hz. The speaker dispersion shall be 105° and frequency response range shall be 86Hz – 15.5kHz, (±5dB). Sensitivity shall be 98dB at 1 Watt / 1 meter. Voice coil impedance shall be 8Ω. Low frequency voice coil diameter shall be 1" (25mm) and operate in a magnet field of at least 10,600 gauss. The maximum depth of the loudspeaker shall not exceed 27 /8" (73mm).

G. IP ENDPOINT SIP STROBE

1. Description: AtlasIED Wall Mount SIP Strobe – IPS-SIS or equivalent.

2. General Performance: AtlasIED IPS-SIS indoor wall mount SIP strobe leverages the VoIP communication solution to enhance critical alert messages with visible signaling in environments that require visual notification to overcome high ambient noise levels or large spaces.
   a. 5 User Blink Scenes Available
   b. User Configurable Brightness
   c. Meets ADA Requirements for Telephony Signaling and Notification
   d. Program or Listen to Up to 10 Multicast Addresses

e. SIP Activation
f. Mailbox Message Waiting Indication
g. Multicast Activation
h. Cisco SRST Support
i. Event-Controlled Relay
j. Tamper Sensor
k. Web-Based Setup
l. PoE-Powered

3. Backboxes: 4 inch square by 2-1/8 inch deep junction box.

2.3 ANALOG ENDPOINTS

A. IP-TO-ANALOG GATEWAY

1. Description: AtlasIED IP-ZCM IP-to-analog gateway with PA702-RMK rack mount kit or equivalent.

2. General Performance: The PoE+ zone controller shall be an IP-to-Analog network gateway with Unbalanced and Balanced line level outputs for connection to power amplifiers or 3rd party audio systems. The unit shall incorporate an 8Ω, 70.7V amplified output to drive analog loudspeaker zones. It shall include two general purpose inputs and one relay output. The unit shall incorporate a line level and microphone input.

   a. The amplifier/control board shall receive announcements and messages using dynamically routed data on a standard Ethernet Network. It shall include a Single-Channel Class D Topology amplifier with Primary and Secondary Outputs capable of producing 25-watts RMS when using an IEEE 802.3at compatible PoE+ switch or 24VDC local power supply and 12-watts RMS when used with an IEEE 802.3af compliant PoE switch. Interconnect shall be via female RJ-45 connector mounted to the PCB.

   b. The amplifier/control board shall include (2) logic inputs, (1) relay output, (1) Auxiliary Unbalanced line level audio input and (1) Unbalanced line level audio output. The Auxiliary Line Level input shall include an auto mute function that is activated when a broadcast is sensed from the control application.

   c. The amplifier/control board shall include a Graphical User Interface (GUI) for SIP configuration. The SIP implementation shall support standards G.711, G.722 and RTP protocols. The Graphical User Interface (GUI) shall configure and manage logic inputs, relay outputs, and Auxiliary audio input.

   d. All control functionality shall be determined via software. It shall be compatible with AtlasIED's GCK, Syn-Apps' SA-Announce, Singlewire's InformaCast software platforms and SIP standalone operation. The IP-to-Analog network gateway overall dimensions (HxWxD) shall be 1.72" x 8.5" x 8.85". Finish shall be neutral black electrostatic powder coat.

B. ANALOG POWER AMPLIFER

1. Description: AtlasIED AA100PHD, 4-input 100-watt mixer amplifier with automatic system test or equivalent.

2. General Performance: 100-watts output power into 25V, 70.7V, or 4 Ω speaker systems. Rear panel DIP switch allows for creation of Zone 2 output/output mix using any or all of the four inputs. Unit can also be set-up to mute Inputs 2, 3, and 4 based on signal from Input 1 for paging applications where other input sources need to be muted during a page. Input 1 and Input 2 are either Mic or Line input selectable and Phantom Power is an option when using either as a mic.

   a. The amplifier/control board shall receive announcements and messages using dynamically routed data on a standard Ethernet Network. It shall include a Single-Channel Class D Topology amplifier with Primary and Secondary Outputs capable of producing 25-watts RMS when using an IEEE 802.3at compatible PoE+ switch or 24VDC local power supply and 12-watts RMS when used with an IEEE 802.3af compliant PoE switch. Interconnect shall be via female RJ-45 connector mounted to the PCB.

   b. The mixer/amplifier shall have a switch-selectable MIC/TEL balanced input to accept either low impedance microphone or Tel/Line Level signals with -60/-10dBV sensitivity. The MIC/TEL input shall include a Phoenix (Euro Block) type connector. The MIC/TEL input impedance shall be 600Ω. The MIC/TEL input shall include an auto mute (VOX Mute) sensitivity control for Input 1. The MUTE SENSE control will allow threshold adjustment of mute activation. The mixer/amplifier shall include two stereo summing auxiliary inputs, unbalanced, -10dBv, with dual-RCA jacks. The auxiliary input impedance shall each be 10kΩ. The mixer/amplifier shall also include an input with a summed stereo 3.5mm input and Phoenix type connector. The level for this device shall be controlled at the device and the level shall only be affected by the Master Level control. The mixer/amplifier shall include one Zone 2 output, a transformer isolated 600Ω output with a maximum level of 1.0VRMS. The mixer/amplifier Zone 2 output shall be assignable from Input 2 or Input 3 via the rear panel dipswitch. The Zone 2 output shall have one rear panel mounted rotary level control. The mixer/amplifier shall incorporate rear panel terminals via Phoenix connector for the REMOTE MUTE function, controlled by an external switch closure. A rear panel dipswitch shall allow assignment of Input 2, Input 3, and/or Input 4 to respond to the mute function activation. The Mute assignment shall not affect the Zone 2 output.

   c. The mixer/amplifier shall have a Pre-Out RCA unbalanced output. The mixer/amplifier shall have a Power Amp input for use with an external signal processor. The mixer/amplifier shall include the Push Here Diagnostic system test circuitry. This test will allow for automatic testing of the connected speaker lines for wiring and impedance errors. The mixer/amplifier shall include Phoenix connectors for both Remote Level Control and Remote Input Selection, which can be activated using the rear panel DIP switches. The Remote Input Selection circuitry shall work with

Atlas Sound wall plate WPD-RISRL and allow Inputs 2, 3, and 4 to be remotely connected, selected, and adjusted from the wall plate. The AA100PHD front panel shall include Inputs 1, 2, and 3 level controls as well as a Master Level control adjustment. System Signal, Peak, Limit, and Power LEDs shall also be incorporated. The mixer/amplifier rear panel shall also include bass and treble tone controls (100Hz and 10kHz, ±10dB). The tone controls shall not affect the Zone 2 output. The mixer/ amplifier front panel shall include an AC Mains power switch.

3. Dimensions: (W x H x D) shall be 8.27" x 3.66" x 10.87" with feet or 3.48" H without feet. Front panel finish and material shall be black ABS.

C. ANALOG SPEAKERS

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

2. Bogen Communications, Inc.
3. Telecor, Inc.
4. Tyco SimplexGrinnell.
5. Or Equal.

D. EXTERIOR VANDAL RESISTANT PUBLIC ADDRESS SPEAKERS

1. Speaker shall be a flange-mount, reentrant type horn loudspeaker enclosed in an industrial grade weather resistant housing and vandal resistant steel enclosure. Speaker enclosure shall be recessed in wall allowing grille to be flush with wall in areas of new construction. Speaker shall be suitable for exterior applications and have the following characteristics:

a. Power rating of 15 watts continuous
b. Frequency response: 600 Hz to 14 kHz.
c. 25 volt and 70 volt compatible.
d. Minimum Dispersion Angle: 100 degrees.
e. Power taps: 15, 7.0, 1.8, 0.9, 0.5 and 0.25 watts @ 25 volts.
f. White, heavy duty, square cast aluminum perforated grille.
g. White, heavy gauge square steel enclosure when exposed.
h. Heavy gauge square steel enclosure with knockouts when recessed.
i. Adapter ring mountable with speaker mounting hardware.

2.4 CONDUCTORS AND CABLES

A. Paired Speaker Cables (Public Address):

1. One pair, twisted, No. 18 AWG, stranded bare copper conductors, or Category 6 cabling if applicable.
2. Rating: CMR
3. Insulation: Polypropylene, not less than .008 inch thick.
4. Jacket: PVC, not less than .017 inch thick.

5. Shielding: One pair for speaker leads, 100% aluminum polyester foil with stranded tinned copper drain wire.
6. Flame Resistance: UL 1666 Riser flame test.
7. RoHS Compliant.

B. Paired, Plenum-Type, Speaker Cables (Public Address):

1. One pair, twisted, No. 18 AWG, stranded bare copper conductors.
2. Rating: CMP.
3. Insulation: Low-smoke PVC, not less than .008 inch thick.
4. Jacket: Low-smoke PVC, not less than .015 inch thick.
5. Shielding: One pair for speaker leads, 100% aluminum polyester foil with stranded tinned copper drain wire.
6. Flame Resistance: NFPA 262 flame test.
7. RoHS compliant.

A. Paired, Underground-Type, Speaker Cables (Public Address):

1. One pair, twisted, No. 18 AWG, stranded bare copper conductors.
2. Rating: CM.
3. Insulation: PVC, not less than .01 inch thick.
4. Jacket: UV Resistant PVC, not less than .025 inch thick.
5. Shielding: One pair for speaker leads, 100% aluminum polyester foil.
6. Flame Resistance: UL1685.
7. Water Penetration Resistance: TIA455-82 Water Penetration Test.
8. RoHS compliant.

B. Patch Cords: Factory-made, Category 6, four-pair cables in [**12-inch**] [**36-inch**] [**48-inch**] **<Insert length>** lengths; terminated with eight-position modular plug at each end. Quantity shall match IP endpoint terminations with a suitable length to accommodate interconnections at each end.

1. Patch cords shall be green in color, have bend-relief-compliant boots with latch guards to protect against snagging.

2.5 IDENTIFICATION

A. Comply with TIA/EIA-606-A and UL 969 for labeling materials, including label stocks, laminating adhesives, and inks used by label printers.

B. Comply with requirements in Section 26 05 53 "Identification for Electrical Systems."

PART 3 - EXECUTION

3.1 ECS SYSTEM IMPLEMENTATION

A. Provide the appropriate personnel to participate in the successful execution of ECS Implementation project. This may include: Project Manager, Voice Engineer, Network Engineer, Server / VMware Engineer, and Notification Stakeholders.

B. Coordinate onsite and scheduled downtimes with site and district personnel.

C. Schedule and perform any after hours work that may be required, such as rebooting phones, switches, or routers.

3.2 FUSION SERVER CONFIGURATION

A. Perform installation and configuration of Fusion Server.

B. Build User-Loader for bulk import of mobile users.

C. Configure recipient groups to receive notifications.

D. Configure device groups to receive notifications.

E. Install and configure IDN to ensure correct registration process.

F. Configure recipient Security groups who share the same set of permissions, often “Admin” and “Receive Only”.

G. Configure notification templates.

H. Configure additional features, including, but not limited to, CallAware, CAP Weather Alerting, Legacy Paging Interface, IP Speakers, Collaboration Groups, and High Availability.

I. Configure paging gateway to facilitate unicast traffic over the WAN

3.3 WIRING METHODS

A. Install cables in pathways and cable trays except within consoles, cabinets, desks, and counters and except in accessible ceiling spaces and in gypsum board partitions where unenclosed wiring method may be used. Conceal pathways and cables except in unfinished spaces.

1. Install plenum cable in environmental air spaces, including plenum ceilings.
2. Comply with requirements in Section 27 05 28 "Pathways for Communications Systems."

3. Comply with requirements in Section 27 05 36 "Cable Trays for Communications Systems."

B. Conceal conductors and cables in accessible ceilings, walls and floors where possible.

C. Wiring within Enclosures:

1. Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii.
2. Install lacing bars and distribution spools.
3. Install conductors parallel with or at right angles to sides and back of enclosure.

3.4 INSTALLATION OF ANALOG CONDUCTORS AND CABLES

A. Comply with EIA/TIA 568A, B and C. NECA 1.

B. General Requirements:

1. Terminate conductors; no cable shall contain unterminated elements. Make terminations only at outlets and terminals.
2. Terminations: Arrange on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures. Cables may not be spliced.
3. Secure and support cables at intervals not exceeding 30 inches and not more than 6 inches from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
4. Install lacing bars and distribution spools.
5. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
6. Match input and output impedances and signal levels at signal interfaces. Provide matching networks where required.
7. Identification of Conductors and Cables: Color-code conductors and apply wire and cable marking tape to designate wires and cables so they identify media in coordination with system wiring diagrams.
8. Weatherproof Equipment: For units that are mounted outdoors, in damp locations, or where exposed to weather, install consistent with requirements of weatherproof rating.
9. Speaker-Line Matching Transformer Connections: Make initial connections using tap settings recommended by Manufacturer.
10. Connect wiring according to Section 26 05 19 "Low-Voltage Electrical Power Conductors and Cables."

C. Open-Cable Installation:

1. Install cabling with horizontal and vertical cable guides in telecommunication spaces with terminating hardware and interconnection equipment.
2. Suspend speaker cable not in a wireway or pathway a minimum of 8 inches above ceiling by cable J-hook supports not more than 60 inches apart.
3. Cable shall not be run through structural members or be in contact with pipes, ducts, or other potentially damaging items.

D. Separation of Wires: Separate speaker-microphone, line-level, speaker-level, and power wiring runs. Install in separate raceways or, where exposed or in same enclosure, separate conductors at least 12 inches apart for speaker microphones and adjacent parallel power and telephone wiring. Separate other equipment conductors as recommended by equipment manufacturer.

E. Modular insert housing installation: Mounted within respective IP enabled device backbox utilizing manufacturer provided adhesive attachment. Orientation shall allow label to be horizontal.

F. Group connecting hardware for cables into separate logical fields.

3.5 BACKBOXES

A. Backboxes shall be installed plumb and level. Grind uneven surfaces to allow exterior backboxes to be installed plumb and level. Grind shall not exceed 1/8” around card reader footprint. Provide a weather proof installation.

B. Provide recessed backboxes allowing for a flush IP endpoint device installation for new construction applications.

C. Provide surface mounted backboxes for modernization or retrofit applications where existing wall surfaces are to remain, unless otherwise directed by the construction documents.

3.6 GROUNDING AND BONDING

A. Ground cable shields and equipment to eliminate shock hazard and to minimize ground loops, common-mode returns, noise pickup, cross talk, and other impairments.

B. Signal Ground Terminal: Locate at main equipment cabinet. Isolate from power system and equipment grounding.

C. Equipment racks shall be grounded to the telecommunications grounding system. Bond equipment racks to the PBB, SBB, or RBB with a minimum #6 AWG green insulated conductor.

3.7 FIRESTOPPING

A. Comply with requirements in Section 07 84 13 "Penetration Firestopping."

B. Comply with TIA-569-B, Annex A, "Firestopping."

3.8 IDENTIFICATION

A. Identify system components, wiring, and cabling complying with TIA/EIA-606-A. Comply with requirements for identification specified in Section 26 05 53 "Identification for Electrical Systems."

B. Develop Cabling Administration Drawings for system identification, testing, and management. Use unique, alphanumeric designation for each cable, connector and terminals to which it connects with same designation. At completion, cable and asset management software shall reflect as-built conditions.

C. Cable Schedule: Post in prominent location in each equipment room and wiring closet. List incoming and outgoing cables and their designations, origins, and destinations. Protect with rigid frame and clear plastic cover. Furnish an electronic copy of final comprehensive schedules for Project.

D. Cabling Administration Drawings: Show building floor plans with cabling administration-point labeling. Identify labeling convention and show labels for telecommunications closets, backbone pathways and cables, terminal hardware and positions, horizontal cables, IP enabled endpoint terminal positions and pathways. Follow convention of TIA/EIA-606-A. Furnish electronic record of all drawings, in software and format selected by District.

E. Cable and Wire Identification:

1. Label each cable within 4 inches of each termination and tap, where it is accessible in a cabinet or junction or outlet box, and elsewhere as indicated.
2. Each wire connected to building-mounted devices is not required to be numbered at device if color of wire is consistent with associated wire connected and numbered within panel or cabinet.
3. Exposed Cables and Cables in Cable Trays and Wire Troughs: Label each cable at intervals not exceeding 15 feet.
4. Label each terminal strip and screw terminal in each cabinet, rack, or panel.
    a. Individually number wiring conductors connected to terminal strips, and identify each cable or wiring group being extended from a panel or cabinet to a building-mounted device shall be identified with name and number of particular device as shown.
    b. Label each unit and field within distribution racks and frames.

c. Labels shall be preprinted or computer-printed type with printing area and font color that contrasts with cable jacket color but still complies with requirements in TIA/EIA-606-A.
d. Cables use flexible vinyl or polyester that flex as cables are bent.

3.9 SYSTEM PROGRAMMING

A. Programming: Fully brief District on available programming options. Record District's decisions and set up initial system program. Prepare a written record of decisions, implementation methodology, and final results.

3.10 FIELD QUALITY CONTROL – ANALOG CONDUCTORS AND CABLES

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Tests and Inspections:

1. Schedule tests with at least seven days' advance notice of test performance.
2. After installing speakers and endpoint device, and after electrical circuitry has been energized, test for compliance with requirements.
3. Operational Test: Test originating station-to-station, all-call, and page messages at each station. Verify proper routing and volume levels and that system is free of noise and distortion. Test each available message path from each station on system.
4. Informacast Test: Initiate test messages to ensure proper install and configuration, successfully complete the test and validation plan
5. Frequency Response Test: Determine frequency response of two transmission paths, including all-call and paging, by transmitting and recording audio tones. Minimum acceptable performance is within 3 dB from 150 to 2500 Hz.
6. Signal-to-Noise Ratio Test: Measure signal-to-noise ratio of complete system at normal gain settings as follows:

a. Disconnect speaker microphone and replace it in the circuit with a signal generator using a 1000-Hz signal. Measure signal-to-noise ratio at paging speakers.
b. Repeat test for each separately controlled zone of paging loudspeakers.
c. Minimum acceptable ratio is 35 dB.

7. Distortion Test: Measure distortion at normal gain settings and rated power. Feed signals at frequencies of 150, 200, 400, 1000, and 2500 Hz into each paging and all-call amplifier, and a minimum of two selected amplifiers. For each frequency, measure distortion in the paging and all-call amplifier outputs. Maximum acceptable distortion at any frequency is 5 percent total harmonics.

8. Acoustic Coverage Test: Feed pink noise into system using octaves centered at 500 and 4000 Hz. Use sound-level meter with octave-band filters to measure level at three locations in each paging zone. Maximum permissible variation in level is plus or minus 3 dB; in levels between adjacent zones, plus or minus 5 dB.
9. Power Output Test: Measure electrical power output of each paging amplifier at normal gain settings of 150, 1000, and 2500 Hz. Maximum variation in power output at these frequencies is plus or minus 3 dB.
10. Signal Ground Test: Measure and report ground resistance at system signal ground. Comply with testing requirements in Section 27 05 26 "Grounding and Bonding for Communications Systems."

C. Inspection: Verify that units and controls are properly labeled, and interconnecting wires and terminals are identified. Prepare a list of final tap settings of paging speaker-line matching transformers.

D. Synchronization: All announcements and signaling tones shall be synchronized throughout the campus.

E. The system will be considered defective if they do not pass tests and inspections.

F. End-to-end cabling will be considered defective if it does not pass tests and inspections.

G. Prepare test and inspection reports.

3.11 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service and initial system programming.

3.12 ADJUSTING

A. On-Site Assistance: Engage a factory-authorized service representative to provide on-site assistance in adjusting sound levels, resetting transformer taps and adjusting controls to meet occupancy conditions.

3.13 DEMONSTRATION AND TRAINING

A. [**Engage a factory-authorized service representative to demonstrate and train**] [**Demonstrate and Train**] District's maintenance personnel and campus administrative staff to adjust, operate, and maintain the emergency communications system.

1. Train District's maintenance personnel on programming equipment for starting up and shutting down, troubleshooting, servicing, and maintaining the system and equipment.

2. Provide “system-admin” training for four individuals, and “end-user” training for up to twelve individuals via virtual classroom.

END OF SECTION 27 15 29

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Section Version February 2020